

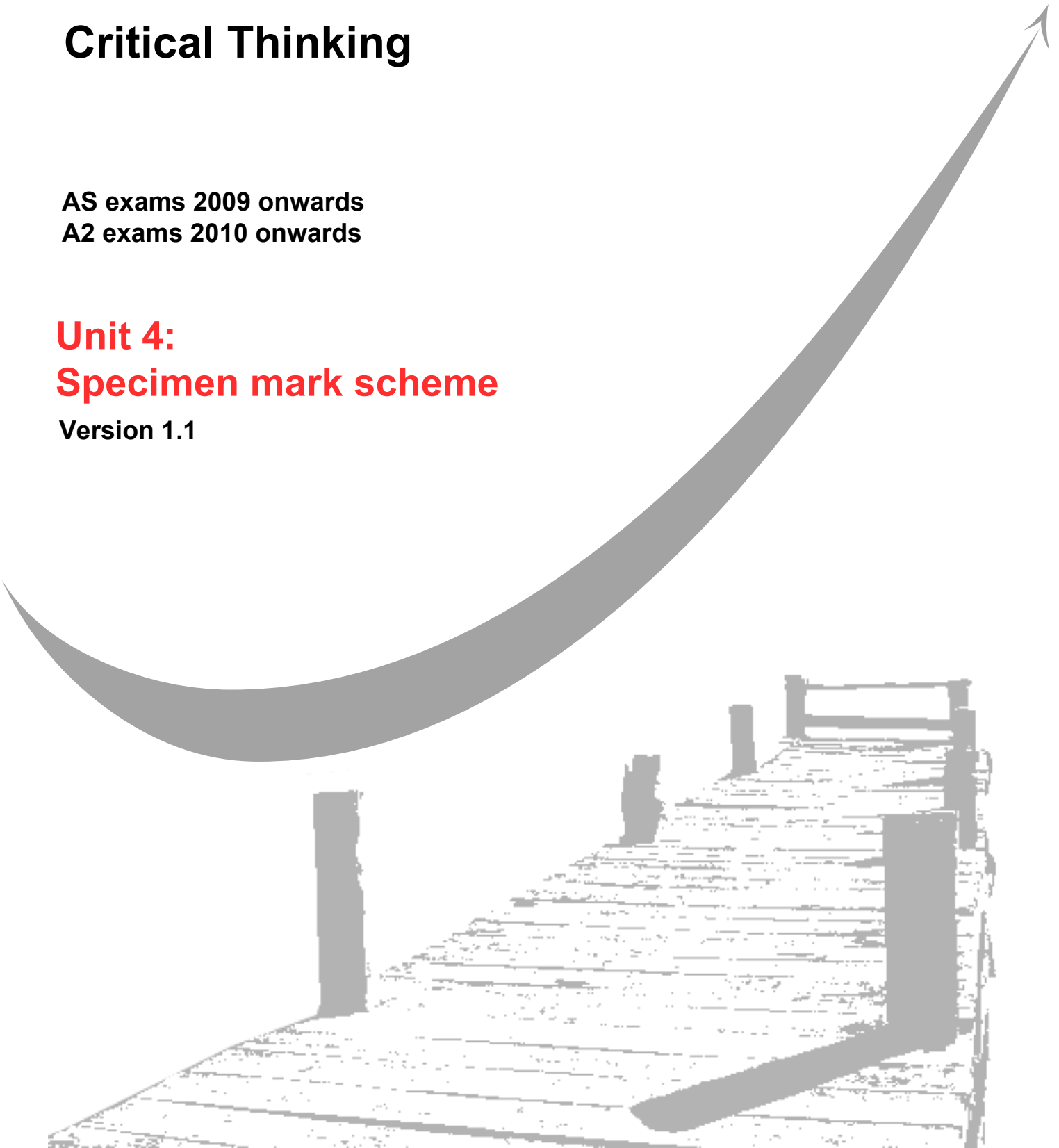
GCE
AS and A Level

Critical Thinking

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 4: **Specimen mark scheme**

Version 1.1



The specimen assessment materials are provided to give centres a reasonable idea of the general shape and character of the planned question papers and mark schemes in advance of the first operational exams

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

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Section A

	AO	1	2	3
<p>1(a) Based on the statistical information, and the estimates provided by the consultants (Document H), which of the two procedures, A or NA, would you advise the company to choose – and why?</p> <p>Your advice should be made on <i>purely economic grounds</i>, by considering the financial implications and the probability of the various possible outcomes.</p> <p>Give a reasoned, economic argument for your decision, supported by relevant calculations. (9 marks)</p>				
<p>The statistical information suggests that Procedure A has been slightly more reliable in the past. On that basis, if the trial has a positive outcome, there is a 70% chance that the end-product will be successful / profitable, whereas there is only a 60% in the case of the NA trial. However, A is more expensive; it does not have the predicted premium of the 'Not tested on animals' logo; and there is a higher risk of expensive compensation claims if there are harmful side effects. If both factors – probability and potential gain/loss – are taken into account, N is the better option.</p> <p>This can be quantified (for example) as follows:</p> <p>A:</p> <p>If the trial is positive there is a potential profit of £12m – 2.8m (cost) = £ 9.2 m, and a 0.7 (70%) probability of realising this. $0.7 \times 9.2 = \mathbf{6.44}$</p> <p>But there is 0.3 probability of an unsuccessful clinical outcome costing £2.8 m. $0.3 \times -2.8 = -\mathbf{0.84}$</p> <p>There is also the 10% chance of an unsuccessful outcome costing a further £10m if product is harmful to humans. $0.3 \times 0.1 \times -10 = -\mathbf{0.3}$</p> <p>If the trial is negative, the cost is the same: - 2.8</p> <p>Balance($6.44 - 0.84 - 0.3 - 2.8$): 2.5</p> <p>NA: (similarly)</p> <p>Potential profit £12m – 1.6m + 0.8m (not-tested-on-animals logo) = £11.6m</p> <p>$0.6 \times 11.6 = \mathbf{6.96}$</p> <p>$0.4 \times -1.16 = -\mathbf{0.64}$</p> <p>$0.4 \times 0.05 \times -10 = -\mathbf{0.2}$</p> <p>Negative or inconclusive trial : -1.6</p> <p>Balance: 4.52</p>	3	3	3	

	[Marks according to the following grid:]													
	<table border="1"> <thead> <tr> <th>Band</th> <th>The Candidate...</th> </tr> </thead> <tbody> <tr> <td>7-9</td> <td>carries out appropriate calculations (e.g. as above) and interprets these correctly to conclude that NA is the better economic option, on the basis of the information available. Communication is effective and the structure logical.</td> </tr> <tr> <td>4-6</td> <td>recognises that statistically A is a more reliable test, but that when this is balanced by costs and other factors NA is the better economic option. There may be some calculation errors but there is some quantitative reasoning to support a decision. Communication is generally clear and the structure reasonably logical.</td> </tr> <tr> <td>1-3</td> <td>recognises the role of the two factors - probability and profit / loss - and makes some use of these in making their decision. There may be little or no calculation, or fundamental errors when interpreting the data. Communication or structural errors may impede understanding.</td> </tr> <tr> <td>0</td> <td>No response or no relevant answer.</td> </tr> </tbody> </table>	Band	The Candidate...	7-9	carries out appropriate calculations (e.g. as above) and interprets these correctly to conclude that NA is the better economic option, on the basis of the information available. Communication is effective and the structure logical.	4-6	recognises that statistically A is a more reliable test, but that when this is balanced by costs and other factors NA is the better economic option. There may be some calculation errors but there is some quantitative reasoning to support a decision. Communication is generally clear and the structure reasonably logical.	1-3	recognises the role of the two factors - probability and profit / loss - and makes some use of these in making their decision. There may be little or no calculation, or fundamental errors when interpreting the data. Communication or structural errors may impede understanding.	0	No response or no relevant answer.			
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1(b)	Give a brief, critical evaluation of the available data in terms of its reliability and relevance. (3 marks)													
	<p>It should be observed that the statistical information is by no means conclusive evidence. [1]</p> <p>In its favour it could be said that it gives some useful indications of costs, benefits, risks and past performance. [1] But it could also be said that (e.g.)</p> <ul style="list-style-type: none"> the figures are estimates / predictions; the margins are relatively small (e.g. 60% / 70%); there are no details of the size of the samples (i.e. number of past trials); there is no clarification of what is meant by 'similar products', so the relevance of past performance may not be great; it cannot be assumed that what has applied in the past will continue to apply. <p>[+ 1 each point up to max. 3]</p>		3											
2	Referring to one or more of the pre-release materials identify one further factor which might have financial implications for the company if it decides on animal trials, and briefly explain why. (2 marks)													
	<p>There may be protests / direct action from anti-vivisection groups [1]</p> <p>According to Document A some of these are directed at client companies, and may affect the one in question. There could be damage to property and/or threats to employees resulting in absenteeism / staff leaving etc. [+1]</p>		1	1										

	OR According to Document F security costs and insurance premiums could be passed on to client companies. [+1]			
3(a)	The ‘facts and figures’ presented in Document D are clearly intended to support the case for animal experimentation. Identify some of the ways in which the data are biased for this purpose. <i>(3 marks)</i>			
	There are numerous points that could be made – e.g. The figures are made to seem small by relating them to the population, especially in the headline: 2 mice and half a rat ... in a lifetime Percentages are frequently used rather than actual numbers (which would have more impact). Some figures are bundled together, possibly to hide specifics – e.g. ‘Dogs, cats, horses and non-human primates were used in less than 1 per cent of procedures.’ Falls are emphasised; rises minimised. Euphemisms are used to lessen the impact of the facts, for example ‘...alleviate the severity of interventions,’ (re. non use of anaesthesia); [1 for each point up to 3]	3		
3(b)	How might an opponent of animal experimentation present some of the same facts and figures in order to support their case? <i>(3 marks)</i>			
	Actual numbers would be more impressive than percentages or relative numbers. For instance, the 1% of cats, dogs, horses... etc. actually amounts to 28,500; and the headline statistic of two mice each in a lifetime comes to 150,000,000; [1] Familiar words such as monkey or chimp might have more impact on readers than ‘non human primates’; or rabbits and guinea pigs rather than ‘other rodents’.[1] Par. 6 could be given a very different emphasis by saying: 87% of experiments are NOT required by law. Similarly, par. 5 could be reversed to state that in 60% of experiments no anaesthesia is given to spare the animals pain, simply because of the cost. [1]			3
Total Section A		6	7	7

SECTION B

4	Find and summarise one example of ethical reasoning from Documents A, B or C of the pre-release material. Use it to explain some of the ways in which ethical grounds are different from economic grounds. <i>(8 marks)</i>			
	Example (from Doc B) Animals have rights and deserve to have their best interests taken into consideration. They are capable of suffering and have an interest in leading their own lives. Therefore, they are not ours to use. [For appropriate example, well summarised - 2]	4	4	

	<p>Candidates should point out that economic grounds are objective and quantifiable: they are about profit, loss, financial consequences, etc. Numerical values can be given to the variables and used to calculate the pros and cons for each choice available. If the numbers favour one choice over another then, economically, it is the right choice and those who disagree are simply wrong.</p> <p>By contrast, some (at least) of the values involved in ethical decisions are neither objective nor quantifiable. For example, there are no facts which, on their own, can conclusively prove that animals are not ours to use. If we accept the first premise – i.e. that animals have rights and interests which ought to be considered – then we would have difficulty disputing the conclusion. But it is a big ‘if’ because no one can say with any knowledge that animals have rights: it is as much of a judgement / opinion as the conclusion itself, and many people disagree with it, for example the author of Document C. Even a claim such as ‘Animals suffer’, or ‘Research procedures are cruel...’ are not factual / quantifiable / objective in the same kind of way as a claim like ‘Procedure A costs £x million.’</p> <p>Candidates could also point out that ethical grounds are often general principles or action-guiding statements such as ‘It is wrong to...’ ‘People ought to...’</p> <p>[For each of 3 (or best 3) points of difference: 1 if recognisable, 2 if clearly explained.</p>			
5	Read the last four lines of the poem <i>Dissection</i> (Document G). What general ethical principle is implicitly assumed here? (2 marks)			
	<p><i>We should not take away / harm / ‘pull apart’ what we can’t replace / repair. OR We shouldn’t take away life if we can’t give it back. [2]</i></p> <p><i>It’s wrong to dissect animals / pull things apart / destroy living things [1]</i></p>	1	1	
	Total Section B	5	5	0

SECTION C

6	Identify the position Stuart Derbyshire argues for concerning animals and medical science. Is it a moderate or an extreme position? (3 marks)			
	<p>It is an extreme position [1]</p> <p>SD argues for a no-compromise attitude towards animal research; and recommends that scientists consider animals only in terms of their usefulness to humans and medical science. [2]</p>	2	1	
7	Identify and briefly explain the two choices Stuart Derbyshire opposes, making clear how they differ from each other. (The pre-release material may be useful here.) (4 marks)			
	<p>The two choices are:</p> <p>Animal rights [1]: the view that animals should be treated broadly as humans are, thus ruling out all use of animals for food, clothing, experimentation, entertainment, etc. [1]</p> <p>Animal welfare (or the 3 Rs) [1]: the view that animals lack rights and that some use of animals is justified, but that it should be kept to a minimum and made as tolerable as possible. [1]</p>	4		

<p>8</p>	<p>“Derbyshire describes the decision facing researchers as a ‘moral choice’ but in reality his own arguments are more pragmatic than ethical.”</p> <p>Is this a fair assessment of the article or not? Give some reasons and examples to support your answer? <i>(5 marks)</i></p>			
	<p>One of SD’s main arguments is that concessions to animal welfare will get in the way of effective research, will play into the hands of those who oppose vivisection and will ‘limit the potential for further research’. It may even spell the end of animal research altogether (par. 11). This is certainly a pragmatic argument more than an ethical one, as it considers the practical consequences of concern for animals and ignores what is intrinsically right or wrong with animal research.</p> <p>He also makes the obvious point that animal research allegedly saves countless lives and prevents human suffering. This again is pragmatic in the sense that it looks at the practical advantages to humans without addressing the rights and wrongs.</p> <p>On the other hand, these arguments could be described as supporting utilitarianism, the principle that what is right is what maximises human happiness (in this case health, wellbeing etc.) SD could be understood as saying that the cost to a limited number of animals is more than balanced by the gain to huge numbers of people, especially the sick. This is consistent with the claims made in the last paragraph where SD states his ‘unequivocal’ belief that human life comes first and that human wellbeing and health come above that of animals. This part of the argument is quite clearly ethical.</p> <p>[Marks: 5 for well-supported, balanced answer on above lines; 3-4 for single answer plus well-developed reasons / examples; 1-2 for single answer plus undeveloped reason / example]</p>	4	1	
<p>9</p>	<p>Identify two possible weaknesses in Stuart Derbyshire’s argument from paragraph 11 onwards. <i>(4 marks)</i></p>			
	<p>There are several questionable assumptions implicit in the reasoning in pars. 15-16. For example:</p> <ul style="list-style-type: none"> • that human lives would be endangered if animal research was curtailed; • that it is necessary to use / continue to use animals to protect or improve human health; • that the lives of some seriously ill people do depend on animal research; • that there are no other ways of achieving the same ends (for human health); • showing concern for animal welfare would retard progress in medical research. <p>The following could be cited as flaws:</p> <p>The ‘fact’ referred to in par. 14 is clearly not a fact but an opinion / judgement.</p> <p>In dismissing the more moderate animal welfare position, and claiming that there is no ‘middle ground’ SD could be charged with restricting the options (fallacy of...), or creating a false dilemma.</p>	4		

	<p>There is a slippery slope in par. 11. According to the author any concessions on animal welfare ‘...will only lead to the ultimate abolition of vivisection’. It does not follow that making concessions inevitably leads to the opposite extreme.</p> <p>[Marks: up to 2 marks for the best 2 weaknesses identified. 2 for identifying and clearly explaining the weakness; 1 for identifying a weakness but not explaining it clearly]</p>			
<p>10</p>	<p>Imagine yourself in the position of a scientist chosen to lead a team on a new medical research project. The end-result could provide relief from a number of human illnesses and may, in some cases, save lives.</p> <p>You must decide whether or not to follow the Derbyshire recommendation on the use of animals, or to adopt one of the alternatives he rejects.</p> <p>In the course of your reasoning you should:</p> <ul style="list-style-type: none"> • Identify some of the possible consequences of each of the options. • Assess the consequences in terms of: <ul style="list-style-type: none"> – their likelihood, – their importance, and – whether they count for or against the choice in question. • Consider which values and/or principles should be taken into account when judging between the options. • Refer selectively to (and/or quote from) the pre-release material where relevant; and introduce some relevant points of your own. • Briefly but clearly explain your decision, and give your main reason(s) for reaching it. <p style="text-align: right;"><i>(24 marks)</i></p>			
	<p>In their responses to Q10 candidates should:</p> <ul style="list-style-type: none"> • consider two options, one being SD’s uncompromising approach and the other either the animal welfare position or an animal rights stand – i.e. no use of animals for research. • identify possible consequences, such as: <ul style="list-style-type: none"> • a negative consequence for medical research of stopping animal experiments (or positive effect of continuing it) • the increased use of human ‘guinea pigs’, and risks attached, if animal testing is curtailed • the growing threat of protest / direct action etc. if animal research continues • assess the consequences, for example: <p>‘Increasing angry protest by animal campaigners is an important issue because it can result in serious harm to individual researchers and their families; also in costly damage to property and disruption to research programmes. Its likelihood is also high: in fact it happens already and shows no sign of lessening. It has to be taken seriously whether the team opts for the Derbyshire</p> 	<p>2</p>	<p>2</p>	<p>20</p>

<p>approach or the animal welfare approach.’</p> <ul style="list-style-type: none"> • introduce values / principles into the argument, for example: <ul style="list-style-type: none"> ○ the value of scientific progress ○ the value of an animal life against a human life ○ the value of human wellbeing against animals lives / wellbeing ○ the principle that humans have no right to use animals at will • refer to the source materials for supporting evidence / explanation / example etc. E.g. the facts and figures in Document D might be used to show how many animals are required for scientific research, and to relate these figures to the population. Document E might be used to explain briefly what the 3Rs entail. • draw on relevant knowledge of their own to make additional points. For example, a candidate might refer to the human trial of drug TGN1412 in 2006, and its catastrophic effect on the subjects, and use this to support the case for more extensive testing on animals, or to point out that animal testing failed on this occasion. • summarise findings and present a conclusion stating their decision. Candidates will need to demonstrate that they have weighed the consequences in the light of the values they have identified as important. Where values conflict – as typically they will – the candidate should declare which values or principles they consider over-riding, and why; and then form their judgement accordingly. A candidate’s conclusion will be marked according to its consistency with the reasoning, weighing of consequences, and application of values. <p>Marks should be awarded according to the following grid:</p>			
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GENERIC MARKING GUIDE

Criterion	Award Level		
	Good response	Reasonable response	Limited response
The candidate has:	Communication is clear and appropriate	Communication is mostly clear and appropriate	Communication errors may impede understanding
• identified a range of possible consequences which may affect the decision	3	2	1
• considered the consequences in terms of their likelihood, importance, etc.	5-6	3-4	1-2
• taken account of relevant values	5-6	3-4	1-2
• made useful reference to the pre-release materials, where appropriate	3	2	1
• introduced some relevant points / arguments / examples etc. of their own	3	2	1
• clearly articulated a conclusion / verdict / decision and main reason(s) for it	3	2	1

	Total Section C	8	11	21
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	Total Section A	6	7	7
	Total Section B	5	5	0
	Total Section C	8	11	21
	Total Paper 4 [70]	19	23	28

Summary of AO weightings at A2-Level

	Total	AO1	AO2	AO3
Paper 3 marks	70	18	26	26
%	100	26	37	37
Paper 4 marks	70	20	24	26
%	100	29	34	37
Total A2 marks	140	37	49	54
%	100	26	35	39

Summary of AO weightings at A Level (AS+A2)

	Total	AO1	AO2	AO3
Paper 1 marks	70	24	24	22
%	100	34	34	31
Paper 2 marks	70	16	24	30
%	100	23	34	43
Paper 3 marks	70	18	26	26
%	100	26	37	37
Paper 4 marks	70	19	23	28
%	100	27	33	40
Total A Level	280	77	97	106
% A2	100	27.5	34.5	38